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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

ANDUJAR, LEONARDO

ART UNIT PAPER NUMBER

2826

DATE MAILED: 01/15/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/039,663

Applicant(s)

EFLAND ET AL.

Examiner

Leonardo Andújar

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 November 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) 24-28 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 October 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group I (claims 1-23) in Paper No. 3 is acknowledged.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the passive electronic components according to claim 6, the encapsulation according to claim 10, the lead frame segments shaped as pin according to claim 12, the contact pads attached to the outside parts by solder according to claim 11, the metallurgical attachment comprising a wire ball, a stitch bonding, a ribbon bonding, and a soldering according to claim 15, the bonding ribbons and the solder balls conductors according to claim 20 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

3. The drawings are objected to under 37 CFR 1.83(a) because they fail to show plurality of windows as described in the specification. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 2, 4 and 12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. Claims 2 recites the limitation "resistance of less than $1.5 \text{ m}\Omega/\square$ " in lines 2 and 3. It is not clear the meaning of the symbol " \square ".

7. Claim 4 recites the limitation "said chip contact pad" in line 33. There is insufficient antecedent basis for this limitation in the claim.

8. Claim 15 recites the limitation "said metallurgical attachment" in line 2. There is insufficient antecedent basis for this limitation in the claim

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Yamasaki et al. (US 5,973,554).

11. Regarding claim 1, Yamasaki (figs. 1-5) shows an integrated circuit chip 71 mounted on a lead frame (61-65) comprising a network distribution lines 5 deposited on the surface of the chip, located directly over active component 70 of the circuit. As

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shown in figure 5 the lines are conductively and vertically connected to the active components below the lines. Also, the lines are connected to a lead frame 62 by conductors 66 (e.g. fig. 1). The majority of the lines patterned as straight lines between the vias and the conductors respectively, thereby minimizing the distance for power delivery between a selected segment and one or more corresponding active components.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamasaki et al. (US 5,973,554).

14. Regarding claim 2 (as understood), Yamasaki shows most aspects of the instant invention, including an integrated circuit having a low interconnection resistance (col. 5/lls. 16-65). Nonetheless, Yamasaki does not disclose that the lines are fabricated with a sheet resistance of less than 1.5 mΩ. The specific sheet resistance claimed by applicant, i.e., 1.5 mΩ, absent any criticality, is only considered to be the "optimum" sheet resistance value of the metal lines disclosed by the Prior Art that a person having ordinary skill in the art would have been able to determine using routine experimentation based, among other things, on the desired accuracy, manufacturing costs, etc. (see *In re Boesch*, 205 USPQ 215 (CCPA 1980)), and since neither non-obvious nor

unexpected results, i.e., results which are different in kind and not in degree from the results of the prior art, will be obtained as long as the metal lines are used as already suggested by the Prior Art.

15. In regards to claim 3, the claim language referring to parasitic electrical losses is considered functional language. Any functional language must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963). Moreover, Yamasaki discloses that voltage drop contributes to the device electrical losses (col. 5/lis. 16-65).

16. Claims 4-8,10-12, 15, 20, 21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamasaki et al. (US 5,973,554) in view of Tani (US 5,468,993).

17. Regarding claim 4 (as understood), Yamasaki (figs. 1-5) discloses a semiconductor device comprising;

- A semiconductor chip having a first and second surfaces;
- An integrated circuit fabricated on the chip first surface having an active components 70;
- A metal layer 4 protected by a mechanically strong, electrically insulating overcoat 6 having a plurality of metal filled vias 9 to make an electrical contact;
- A plurality of windows to expose the circuit contact pads;

- Electrically conductive films 5 deposited on the overcoat and patterned into a network of lines substantially vertically over the active components, the film is in contact with the vias 9 and having an outermost surface being non corrodible and metallurgical attachable metal;
- A lead frame (61-65) having a first plurality of segments providing electrical signal and a second plurality of providing power and ground;
- And electrical conductors 66 connecting the chip contact pads (P1-P5) and/or the connecting the network lines with the plurality of segments.

18. The network pattern distributes the power current and the ground potential (e.g. fig. 5). Yamasaki discloses that the chip is mounted on the lead frame. Nonetheless, Yamasaki fails to further specify that the semiconductor chip is mounted on a chip mount pad. Tani discloses that it is conventionally in the art to attach the semiconductor chip to a chip mount pad (col. 1/lls. 17-28). As shown in fig. 3 the second surface of the chip 3 is attached to the chip mount pad 1. It would have been obvious to one of ordinary skill in the art at the time the invention was made to attach the second surface of the semiconductor chip to a chip mount pad as it is conventionally in the art as taught by Tani.

19. Regarding claim 5, Yamasaki discloses that the chip is made of silicon (col. 2/lls. 64-66).

20. Regarding claim 6, Yamasaki shows that the normally the circuit comprises a plurality of active and passive electronic components (e.g. fig. 10).

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21. Regarding claim 7, Yamasaki discloses that the circuit comprises multi-layer metallization made of aluminum (col. 8/lis. 9-51).

22. Regarding claim 8, Yamasaki discloses the claimed invention except for the use of silicon nitride, silicon oxynitride, silicon carbon alloys or polyimide for make the overcoat 6. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use of silicon nitride, silicon oxynitride, silicon carbon alloys or polyimide for make the overcoat 6, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ416.

23. Regarding claims 10 and 11, Tani discloses that the semiconductor chip and the bonded portion are sealed by synthetic resin molding or molding (col. 1/lis.19-28). Tani does not specify the process used to make the encapsulation e.g. transfer molding process. Nonetheless, this limitation is considered a process limitation. Note that in product related claims only the final product is relevant, not the process of making such as transfer molding. Note that a "product by process" claim is directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ 15 at 17. See also In re Brown, 173 USPQ 685; In re Luck, 177 USPQ 523; In re Fessmann, 180 USPQ 324; In re Avery, 186 USPQ 161; In re Wertheim, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); and In re Marosi et al., 218 USPQ 289, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "

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product by process" claims or not. Note that applicant has the burden of proof in such cases, as the above caselaw makes clear. See also MPEP 706.03(e).

24. Regarding claim 12, Tani discloses that the lead frame segment portions are not included in the encapsulation. Also, the leads are shaped as leads which are solderable to the outside parts (e.g. fig. 3, col. 1/lis.19-28).

25. Regarding claim 15, (as understood), Yamasaki shows that the conductors/metallurgical attachments are bonding wires.

26. Regarding claim 20, Yamasaki shows that the conductors are bonding wires.

27. Regarding claim 21, Tani discloses that the semiconductor chip is bonded to the leads radially disposed around the die pad with gold wires (col. 1/lis.19-28).

28. Regarding claim 23, Yamasaki shows that the network of lines is electrically connected to the segments that are suitable for outside electrical contact.

29. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamasaki et al. (US 5,973,554) in view of Tani (US 5,468,993) in view of Applicant's Admitted Prior Art.

30. Regarding claim 9, Yamasaki in view of Tani shows most aspects of the instant invention. However, Yamasaki in view of Tani does not disclose that the lead frame is prefabricated from a sheet like material selected from a group consisting of copper, copper alloy, aluminum, iron nickel alloy or invar. However, this limitation is considered to be a process limitation. Note that in product related claims only the final product is relevant, not the process of making such as a pre fabricated lead frame. Note that a "product by process" claim is directed to the product per se, no matter how actually

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made, In re Hirao, 190 USPQ 15 at 17. See also In re Brown, 173 USPQ 685; In re Luck, 177 USPQ 523; In re Fessmann, 180 USPQ 324; In re Avery, 186 USPQ 161; In re Wertheim, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); and In re Marosi et al., 218 USPQ 289, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that applicant has the burden of proof in such cases, as the above caselaw makes clear. See also MPEP 706.03(e). In regards to the material used to make the lead frame, Applicant's Admitted Prior Art discloses that it has been common practice to manufacture single piece lead frames from thin sheets of metal. For reasons of easy manufacturing, the commonly selected starting metals are copper, copper alloy, iron nickel alloys and invar (pg 2/pp. 03). It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the lead frame of Yamasaki in view of Tani of copper, copper alloy, iron nickel alloys or invar for easy manufacturing reasons as taught by Applicant's Admitted Prior Art.

31. Claims 13, 20 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamasaki et al. (US 5,973,554) in view of Tani (US 5,468,993) in view of Wolf et al.

32. Regarding claim 13, Yamasaki in view of Tani shows most aspects of the instant invention including lines and contacts pads attached to the outside part by conductors 66. However, Yamasaki in view of Tani does not disclose that solder balls can be used

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as connection means. Nonetheless, the use of wire bonds or solder balls as connection means is considered an obvious design choice and it is not patentable unless unobvious or unexpected results are obtained from these changes. It appears that these changes produce no functional differences and therefore would have been obvious. Note *In re Leshin*, 125 USPQ 416. For example, the advantages of flip chip bonding (solder ball or C4) are: 1) the entire chip surface can be covered with solder bumps. In other words, bonding locations are not limited to the chip perimeter, thus more I/O capability is provided than by a perimeter interconnections on a die with the same size, and 2) the very short lengths of the chip to package interconnection paths minimizes their inductance (see Wolf pages 857-8). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use solder balls to make the electrical connections of the device disclosed by Yamasaki in view of Tani in order to provide more I/O capability and to minimizes the inductance as taught Wolf.

33. Regarding claim 20, Yamasaki in view of Tani shows most aspects of the instant invention including bonding wires conductors. However, Yamasaki in view of Tani does not disclose that solder balls can be used as connection means. Nonetheless, the use of wire bonding or solder ball connections is considered an obvious design choice and it is not patentable unless unobvious or unexpected results are obtained from these changes. It appears that these changes produce no functional differences and therefore would have been obvious. Note *In re Leshin*, 125 USPQ 416. For example, the advantages of flip chip bonding (solder ball or C4) are: 1) the entire chip surface can be covered with solder bumps. In other words, bonding locations are not limited to the

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chip perimeter, thus more I/O capability is provided than by a perimeter interconnections on a die with the same size, and 2) the very short lengths of the chip to package interconnection paths minimizes their inductance (see Wolf pages 857-8). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use solder balls to make the electrical connections of the device disclosed by Yamasaki in view of Tani in order to provide more I/O capability and to minimizes the inductance as taught Wolf.

34. Regarding claim 22, Wolf discloses that the can be made of tin/lead alloy (pages 857-8).

Allowable Subject Matter

35. Claims 14 and 16-19 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Conclusion

36. Papers related to this application may be submitted directly to Art Unit 2826 by facsimile transmission. Papers should be faxed to Art Unit 2826 via the Art Unit 2826 Fax Center located in Crystal Plaza 4, room 3C23. The faxing of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2826 Fax Center number is **(703) 308-7722** or **-7724**. The Art Unit 2826 Fax Center is to be used only for papers related to Art Unit 2826 applications.

37. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Leonardo Andújar** at **(703) 308-0080** and between the

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hours of 9:00 AM to 7:30 PM (Eastern Standard Time) Monday through Thursday or by e-mail via Leonardo.Andujar@uspto.gov. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn, can be reached on (703) 308-6601.

38. Any inquiry of a general nature or relating to the status of this application should be directed to the **Group 2800 Receptionist at (703) 305-3900.**

39. The following list is the Examiner's field of search for the present Office Action:

Field of Search	Date
U.S. Class / Subclass (es): 257/207, 208, 209, 691, 666	01/03
Other Documentation:	
Electronic Database(s): East (USPAT, US PGPUB, JPO, EPO, Derwent, IBM TDB)	01/03

Leonardo Andujar

Patent Examiner Art Unit 2826

LA
1/6/03

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